AFFECTED ENVIRONMENT

This section presents relevant resource components of the existing environment that would be affected by the alternatives if implemented. This section provides a baseline for comparisons made in the Environmental Consequences section of this appendix. A complete description of the Loess Hills natural, cultural, social, and economic environment is provided in the body of the Special Resource Study, and accompanying appendices (A-D). A generalized description is provided below.

Geology

The Loess Hills consists of large continuous tracts of deep silt deposited by the wind 30,0000 to 12,000 years ago, and sculpted into distinctive terrain during the last 12,000 years. The terrain is characterized by distinctive shapes: steep, narrow ridge crests, peaks, and saddles; numerous steep side slopes and branching spurs; and precipitous bluffs, some with sheer, nearly vertical faces rising from the adjoining Missouri River floodplain.

These massive accumulations of unconsolidated lightweight material, unlike sand dunes, normally remain remarkably firm and stable. Cohesion of the silt particles enables steep, dramatic bluffs to stand erect and intact as long as the loess remains dry and undisturbed. Normally, precipitation moves quickly off the steep slopes and the well-drained loess dries rapidly. However, if saturated or disturbed, the particles can succumb easily to forces of water and gravity. This combination of particle cohesion and high erosion potential explains the shapes that dominate this landform region. Slabs – sometimes entire bluffs – of saturated loess collapse and slump downslope; eroded loess spreads out into valley bottoms or is carried away in sediment-laden streams; dramatic gullies advance headward and deepen. The natural erosion of loess has been intensified by human activities. The frequency of slope failure has increased in response to increased water infiltration and weight associated with a variety of human activities. Quarrying operations, borrow pits for fill-dirt, housing developments particularly along ridge tops on the western edge, and removal of the vegetative cover all contribute to erosion, gully formation, and slope failure (see Part I). The maximum loess thickness and the most accessible and economically exploitable deposits lie in a narrow band nearest the Missouri Valley bluffs.

Natural Communities

Until the 1850s, native prairies dominated the Loess Hills. Eastern deciduous forest species flourished only in moist sites along creeks and at the base of sheltered slopes. A dynamic border separated the two major types of ecosystems, with frequent wildfires favoring the prairie grasslands. The post-settlement exclusion of wildfire has allowed woodlands to expand into many areas previously covered by prairie. Approximately 700 species of vascular plants – over a third of Iowa's flora – have been identified in the Loess Hills, including tall grass prairie and eastern hardwood forest species.

Approximately three percent of the landform remains as prairie (Selby 2000). These prairies cover broad expanses of the western most bluffs and sun-and wind-exposed ridgetops with their adjacent south-and west-facing slopes. Protected from intensive agricultural use by the steep topography, they have retained much of their original integrity and diversity and remain relatively large. Little bluestem and side-oats gramma dominate the dry prairies. Forbs such as skeletonweed, soapweed, and scarlet gaura are found in mid-grass communities (See Appendix C for scientific names).

Woodlands now include about 11 percent of the landform (Iowa Department of Natural Resources 1992). Bur oak is the most abundant tree species. Subdominants such as ironwood or red elm may commingle with the bur oak but the understory of bur oak woodlands is often sparse, consisting of a few common species such as Virginia creeper. Very dense eastern red cedar woodlands are present in some pastures and disturbed areas. Invasive woodlands of green ash and red elm mix with cottonwood, ironwood, or other trees to cover very disturbed hillsides. Although uncommon, older forests occupying historically wooded locations remain western outposts of the eastern deciduous forest. These are found usually as pockets in deep ravines.

Invasive shrubs and exotic plants are encroaching throughout the Loess Hills, particularly where overgrazing has occurred and natural fires are suppressed. Native woodland edge species are expanding into prairies and many other areas have been converted to pastures or cultivated fields. Eighty-six percent of the landform is composed of row crop, pastures, hayfields and other areas lacking shrubs or trees (Iowa Department of Natural Resources 1992).

Wildlife

Woodland animals include common species such as the fox squirrel, eastern cottontail, and woodchuck, as well as a diverse assemblage of birds. Larger animals such as the red fox, white-tailed deer, and coyote wander between woodlands and grasslands. A few rare species such as the hickory hairstreak butterfly and speckled kingsnake also inhabit Loess Hills forests. Forest animals in general are increasing and expanding their ranges northward as woodlands expand, often at the cost of prairie animals. For example, all increasing Loess Hills reptiles are woodland species, while prairie reptiles are declining in number (Christiansen and Mabry 1985).

Threatened and Endangered Species

Numerous state-listed species make their habitats in the Loess Hills. These species are listed in Appendix A. The following federally-listed species are known to occur in one or more of the counties that the landform is located in: Indiana Bat (*Myotis sodalis*), Bald Eagle (*Haliaeetus Leucocephalus*), Piping plover (*Charadrius melodus*), Topeka Shiner (*Notropis topeka*), Pallid Sturgeon (*Scaphirhynchus albus*), Least tern (*Sterna antilarum*, and the Western Prairie Fringed Orchid (*Platanthera praeclara*). Of these, there are two species which nest in selected areas near the Missouri River in Sioux City and Council Bluff (Howell, personal communication). There are no other known occurrences of federally listed species within the boundaries of the Loess Hills landform region (Figure 1).

Wetlands/Floodplains

Maps of the Loess Hills landform region were produced using summit heights, distinct topographic features, steepness of slope, local relief, loess thickness, and drainage density. The floodplains of rivers and streams through the Loess Hills were purposely included to provide a holistic, continuous depiction of the landform region. As such, two classes of streams are found in the Loess Hills. The first class includes the numerous small, intermittent streams originating in local Loess Hills watersheds. These have not been channelized. There are also larger streams in big valleys such as the Little Sioux, Floyd, Maple, and Boyer, which originate east of the Loess Hills, and cross through the region before joining the Missouri River. Most of these tributaries have been channelized in their lower reaches or are silt-laden and unproductive. Broad, alluvial plains are associated with the larger streams, including some oxbow lakes and backwater sloughs. Small impoundments are also scattered on lower slopes throughout the region. The natural alluvial wetlands in particular often are within the view of scenic vistas from the Loess Hills.

Prehistoric Resources

There are 827 archeological sites that have been recorded within the Loess Hills, though an extremely small percentage of the region has been subjected to intensive, systematic archeological surveys. Most of the 827 sites were discovered as the result of erosion or development activities, such as quarrying, channelization, and construction projects. These activities resulted in indirect damage to, and in many cases, destruction of, archeological resources. Two properties in the Loess Hills are listed on the National Register of Historic Places because of their archeological significance. Many other significant archeological sites exist but have not been evaluated against the criteria for inclusion in the National Register of Historic Places. Currently, there is not a comprehensive list of archeological properties that are *eligible* for the National Register of Historic Places, although several sites have been determined eligible, or are considered eligible by the State Historical Society of Iowa (Jones personal communication). Undoubtedly there are thousands more that have yet to be discovered and recorded.

Historic Resources

There are four National Historic Landmark (NHL) properties in the Loess Hills, all of which are publicly owned and accessible. The four properties, which are described further in the body of the Special Resource Study, include: 1) *Floyd Monument*: located in Sioux City, 2) *The Sergeant Floyd* survey and tug boat: located in Sioux City, 3) *Woodbury County Courthouse*: *Occupying* nearly a city block in Sioux City, and 4) *Dodge House*: a residence associated with a Civil War General, located in Council Bluffs. Over 50 properties are listed to, or are eligible for listing to, the National Register of Historic Places.

Scenic Resources

The sharply defined western edge of the region is the strongest and most scenic characteristic; the stark contrast along the bluff and the river floodplain creates the most recognizable visual “signature” of the landform. Bordering the Missouri River on the east,

the range of bluffs rises steep and, in many places almost perpendicular from two to three hundred feet in height. The range is parted by numerous narrow valleys and ravines, which descend from the adjacent uplands, but never loses its distinctive outlines. Prairies, woodlands, and fields offer diversity in color, shape, and texture, which changes with the seasons.

Human adaptations to the landform, particularly agricultural uses, contribute to the scenic quality and character of the Loess Hills. Within the interior landform, scenic views unfold along the rural byways that traverse the Loess Hills. Small towns, farms, churches, and cemeteries are dispersed throughout the landscape. Cropland or pastures that step up the terraced hillsides surround houses and barns located in valleys. From high points on the bluffs, spectacular views open up over the Missouri floodplain.

Residential developments, quarry operations, and telecommunications towers are visually intruding upon the landscape in portions of the Loess Hills. Entire bluffs have been removed for construction fill, and quarry operations have cut into hillsides. Over 50 licensed operations are known to have extracted materials in the Loess Hills, 27 of these are active operations and many are visible from Interstate 29, particularly near Sioux City and Council Bluffs. Several housing developments along the tops of ridges are also visible from the Interstate. All of these activities have altered scenic vistas and disrupt the continuity of cultural and natural landscapes.

Viewshed mapping for the Loess Hills National Scenic Byway Corridor was performed during development of *The Loess Hills Scenic Byway Corridor Management Plan* (Golden Hills Rural Conservation Development 1998). A viewshed, as defined by the Byway Plan, is a quantitative measure of distance seen from a given point on the Byway. Viewshed maps can assist with the development of land use strategies to preserve the scenic quality of the Loess Hills.

Population

The seven counties have a combined 2000 population of just over 264,000 (U.S. Census Bureau 2001). All counties within the study area lost population between the 1980 and the 1990 censuses. That trend, however, has largely reversed during the 1990s. Fremont and Monona County continued to experience a decline in population during the past decade. Mills County, because of its proximity to the Omaha metropolitan area, has realized the greatest expansion in population, growing by more than 11 percent during the 1990s. The racial composition of the study area is largely Caucasian (over 96 percent of the population). Only Woodbury and Pottawattamie Counties have non-white populations greater than one percent. Between 1990 and 2000, most of the growth in western Iowa occurred in the Omaha-Council Bluffs or Sioux City areas (U.S. Census Bureau 2001), and included an increase in Hispanics.

A number of small communities can be found throughout the hills, in addition to portions of the metropolitan communities of Sioux City and Council Bluffs. Many of these communities have seen population trends that parallel those of the county where they are located. The populations of most communities within Fremont County have declined over the past two

decades. Conversely, many of the communities in the Woodbury County, which includes Sioux City, have experienced double-digit population gains over the same period.

Economy

Agriculture has been highly important to the Loess Hills counties. However, the nature and extent of farming is in transition. Farming is experiencing trends similar to those observed in many other agricultural regions. For example, the number of farms in the study area has steadily declined over the past three decades while, concurrently, the average size of a farm has increased. As noted previously, the farm crisis of 1984 affected the state; by 1987, Iowa had 22,000 fewer farms than it had in 1973 (Schweider 1996).

Overall, the counties of the study area have a comparatively diverse economy. Manufacturing is the leading economic sector in Fremont and Plymouth Counties. The service sector is the primary sector in Monona, Pottawattamie, and Woodbury Counties. The government sector accounts for more than one-third of total earnings in Mills County. In terms of earnings, farming is the leading economic sector for one county in the study area, Harrison County. Farming accounts for approximately 23, 22, and 21 percent of the source of earnings for Monona, Harrison, and Fremont counties, respectively.

According to data from the Iowa Department of Natural Resources (IDNR 1997), there are 27 state-licensed mining operations active in the Loess Hills. An additional 25 licensed facilities within the region are listed as "closed." Almost all of these facilities extract sand and gravel; a few quarry limestone or agricultural lime. Most operations are small businesses, employing fewer than 20 people. About one dozen such businesses operate within the counties of the study area. Iowa statute and regulation does not consider loess a mineral, hence, the Iowa Division of Soil Conservation does not license or register sites working with just loess. As a result, the full extent and impact of loess extraction is difficult to quantify.

Tourism is important to the economy of western Iowa. The Loess Hills, related resources, and other nearby attractions are magnets that attract recreationists and other visitors to the region. Visitors to the area require amenities such as service stations, restaurants, and lodging. The retail and service sectors account for between 16.6 and 41.4 percent of total earnings in the seven counties of the study area (Iowa State University Extension 1997). Visitor services are well distributed through the Hills. Gasoline, diesel fuel, automobile service, lodging, and restaurants can be found in many communities. Hospitals or medical services are found in Sioux City, Moorhead, Missouri Valley, Tabor, Riverton, and Council Bluffs. Camping, both for tents and for recreational vehicles, is available in several locations.

According to *the Loess Hills Scenic Byway Corridor Management Plan* (GHRC&D 1998), there are more than 100 parks, recreation and wildlife areas, and outdoor recreation attractions in the Byway corridor (650,000 acres). These attractions cover more than 57,000 acres of land. Table 5 lists over 50 of the outdoor recreation areas along the Loess Hills Scenic Byway and within the seven-county region. The areas shown in Table 5 range between two and 9,800 acres, with the majority being less than 100 acres in size.

The DeSoto National Wildlife Refuge (9,800 acres), located along the Missouri River in Harrison County, outside of the study area, is the only federally owned and managed facility near the study area. The Lewis and Clark National Historic Trail (NHT), a component of the National Trails System, parallels the Loess Hills from the Missouri state line to Sioux City.

Other attractions not directly associated with the Loess Hills also encourage visitors to the region. Examples of places in or near the landform region that draw people to the area include the Sioux City Art Center, Siouxland Historical Railroad Museum, Western Historic Trails Center, General Dodge House, Mount Crescent Ski Area and several casinos. Attractions near Omaha, Nebraska also bring people to the area. These include the Henry Doorly Zoo, Joslyn Art Museum, and the Western Heritage Museum.

Land Ownership

Approximately 39,500 acres (six percent) of the 640,000-acre study area are within the boundaries of incorporated areas. Hence, nearly 94 percent of the study area is unincorporated. Only 4.4 percent of the landform region is in public ownership or owned by The Nature Conservancy, a private conservation organization (Figure 3). The vast majority of the region is privately owned.

Growth in residential development in the counties of the study area, as evidenced through the number of permits issued for new private housing units, has shown a generally upward trend over the past two decades. Further, the demand has accelerated during the 1990s. Between 1979 and 1990, the average number of private housing units authorized by building permits for the entire seven-county region that includes the study area was 41 412 per year.

Conservation Programs and Land-Use Planning

A number of state and federal conservation programs are contributing staff and funding for erosion control, wildlife habitat and water quality improvement, and prairie restoration programs in the Loess Hills. The Loess Hills Alliance (LHA), Fish and Wildlife Foundation, Golden Hills Resource Conservation and Development, Iowa Natural Heritage Foundation, Soil and Water Conservation Districts, The Nature Conservancy, and other groups continue to provide information and services associated with a variety of conservation programs. In 2000, the LHA provided funding and matching grant opportunities that resulted in over $750,000 of land protection or economic growth projects (Loess Hills Alliance 2000). An ongoing effort, the Whole Farm planning initiative is utilized by six of the seven counties included in the Loess Hills landform region. Designed as a matching grants program with local Soil and Water Conservation Districts (SWCD) and in cooperation with the Iowa Division of Soil Conservation, local SWCD were able to promote and complete whole farm plans on 250 acres of private land. Whole farm plans are designed to encourage landowners to make maximum use of available state and federal soil, water, wildlife, and conservation programs (Loess Hills Alliance 2000). Most recently, $250,000 has been earmarked under the Farmland Protection Program (FPP) to preserve the Loess Hills from non-agricultural development.

The Nature Conservancy, Fish and Wildlife Foundation, the U.S. Fish and Wildlife Service and the National Park Service have provided landowner assistance (funding, staff, and/or equipment) for prairie restoration, woody plant and exotic species control, and have conducted workshops on fire ecology and the use of prescribed fire.

A number of comprehensive planning and zoning efforts are currently underway. The LHA began soliciting requests for proposals to prepare a Comprehensive Plan for the seven-counties of the Loess Hills. This purpose of this plan will be to document existing studies and other land-use data and serve as a template for counties in the Loess Hills to use (Sproul 2001). Plymouth County has developed a Comprehensive Plan, and two counties, Mills and Woodbury, are developing updated Comprehensive Plans. The LHA is also developing a grant program to encourage county and city governments to undertake comprehensive planning and zoning which consider critical resource protection strategies for the Loess Hills landform. Finally, the *Loess Hills Scenic Byway Corridor Management Plan* (Golden Hills Rural Conservation Development 2000) is a useful tool available for land use planning. The *Byway Plan* identifies important resources and includes model ordinances designed to preserve the integrity of the resources in the Loess Hills.